Background of the study

The discovery of X- rays is considered as the discovery of the 20th century. It has its boon as it is an important tool for diagnosis and treatment in medical and dental practice. However its bane remains as ionizing radiation is a well known mutagen and carcinogen for the human population. It is largely known that there is no safety in radiation doses and that the biological effects of exposure received would be accumulated through time. In order to detect the effects of low dose ionizing radiation in diagnostic radiology various sensitive analysis are needed.

Aim

The aim of this study is the evaluation of genotoxicity and cytotoxicity in patients after exposure to digital radiographs.

Materials & methods

Clinically healthy patients who required orthodontic treatment were selected. As a part of their treatment plan, they were exposed to x rays for making orthopantomogram and lateral cephalogram. Smears were taken from the buccal mucosa before exposure and 10±2 days after exposure. The smears were fixed and stained with DNA specific PAP stain using RAPID PAP™ staining kit. 100 cells were analyzed on each slide under 40 × magnification using light microscope with the help of AP viewer.

1. For the evaluation of Genotoxicity, presence of micronucleus was estimated.

2. For the determination of cytotoxicity, parameters taken were Karyorrhexis, karyolysis and pyknosis.

Results

There was a significant increase in the number of micronuclei after radiation exposure which indicates that the x rays can produce genotoxic damage to the cells. There was also an increase in the number of other nuclear alterations after exposure which indicated the increased cytotoxicity produced by radiation. There is no gender predilection found in this study.

Conclusion

Radiography is one of the most valuable diagnostic tool used in comprehensive dental care for diagnosis, treatment planning and for follow up. This study concluded that even low level ionizing radiation can induce both genotoxic and cytotoxic damage to the cells. Hence radiographs should be advised only when it is of utmost necessity.

KEYWORDS: Ionizing radiation, Micronucleus, Karyorrhexis, Karyolysis, Pyknosis